**Targeting glioma cancer stem cells with receptor-engineered self-renewing memory T cells**

## Grant Award Details

Targeting glioma cancer stem cells with receptor-engineered self-renewing memory T cells

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| **Grant Type:** | Early Translational III |
| **Grant Number:** | TR3-05641 |
| **Project Objective:** | Goal of the project is to develop antigen specific CAR-based immunotherapy for glioblastoma (GBM). Stem cell like , self renewing T memory cells are gene modified to express CAR targeting IL13Ralpha2. CAR-T cells are designed to target and kill glioma initiating cancer cells. |

**Investigator:**

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| **Name:** | Stephen Forman |
| **Institution:** | City of Hope, Beckman Research Institute |
| **Type:** | PI |

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| **Name:** | Christine Brown |
| **Institution:** | City of Hope, Beckman Research Institute |
| **Type:** | Co-PI |

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| **Disease Focus:** | Brain Cancer, Cancer, Solid Tumors |
| **Human Stem Cell Use:** | Adult Stem Cell |
| **Cell Line Generation:** | Cancer Stem Cell |
| **Award Value:** | $5,215,447 |
| **Status:** | Closed |

## Progress Reports

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| **Reporting Period:** | Year 1 |
| **View Report** | |

| **Reporting Period:** | Year 2 |
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| **View Report** | |

| **Reporting Period:** | Year 3 |
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| **View Report** | |

| **Reporting Period:** | Year 4/NCE |
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| **View Report** | |

## Grant Application Details

| **Application Title:** | Targeting glioma cancer stem cells with receptor-engineered self-renewing memory T cells |
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| **Public Abstract:** | While current treatment strategies for high-grade glioma can yield short term benefits, their inability to eradicate the highly tumorigenic cancer stem cell population results in disease recurrence in the vast majority of patients. Stem cells and some cancer cells (the targets of our therapy) share many common characteristics, including the ability to self-renew and grow indefinitely. These cancer stem cells are also resistant to many standard therapies including radiation and chemotherapy, creating a critical need for novel therapies that will efficiently eliminate this cell population. We propose here to develop and optimize a therapeutic strategy, termed "adoptive T cell therapy", that will eliminate the brain tumor stem cell population by re-directing a patient's immune cells, specifically T cells, to recognize and destroy tumor stem cells. Our goal is a therapy in which a single administration of tumor-specific T cells results in long-term anti-glioma protection. Our approach builds on previous findings that T cells, when reprogrammed, can potently kill glioma stem cells. Furthermore, we will exploit the self-renewing stem cell-like properties of a defined T cell population (central memory T cells) to establish reservoirs of long-lasting tumor-directed T cells in patients with glioma, and thereby achieve durable tumor regression with a glioma-specific T cell product. Our findings can then be applied to cancers besides glioma, including tumors that metastasize to brain. |
| **Statement of Benefit to California:** | The goal of this project is to develop a novel and promising immunotherapy utilizing genetically modified T cells to target glioma stem cells in order to improve cure rates for patients with high-grade malignant glioma. Our strategy, in which a single administration of tumor-specific T cells results in long-term anti-glioma protection, has the potential to provide significant therapeutic benefit to patients with brain tumors, for which there is a dearth of effective treatment options. Further, the tumor-specificity of this therapy is intended to improve the quality of life for patients with high-grade gliomas by reducing treatment related side-effects of conventional therapies. Moreover, due to the high cost hospital stays and treatments usually required for patients with advanced disease, this therapy, by generating long-lasting anti-cancer immunity, has the potential to significantly reduce the costs of health care to California and its citizens. Carrying out these proposed studies will have further economic benefit for California through the creation and maintenance of skilled jobs, along with the purchasing of equipment and supplies from in-state companies. This project will also yield long-reaching benefit through continuing to build the larger CIRM community that is establishing California as a leader in stem-cell and biomedical research both nationally and internationally. |